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TWO NEW SPECIES OF *MATSUCOCCUS* COCKERELL (HOMOPTERA: MARGARODIDAE) SIMILAR TO *MATSUCOCCUS ALABAMAE* MORRISON[1]

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Abstract.—The adult females of 2 new species of the margarodid genus *Matsucoccus* (Homoptera: Coccoidea), ***M. banksianae*** and ***M. oocarpae*** are described and illustrated. *Matsucoccus banksianae* was collected on *Pinus banksiana* in Minnesota. *Matsucoccus oocarpae* was collected on *P. oocarpa* in Guatemala. Both species are morphologically similar to *M. alabamae* Morrison, *M. californicus* Morrison and *M. vexillorum* Morrison.

Key Words: Homoptera, Coccoidea, Margarodidae, *Matsucoccus banksianae, Matsucoccus oocarpae*

The genus *Matsucoccus* Cockerell (1909) is a group of pine-infesting margarodids found throughout most areas of the Northern Hemisphere where pines are found. Recent investigations have led to the discovery of 2 new species, increasing the number of described species in the Western Hemisphere to 19. Both new species are morphologically similar to 3 species described by Morrison (1939), *Matsucoccus alabamae, M. californicus* and *M. vexillorum. Matsucoccus alabamae* is found in the Southeastern United States, *M. californicus* in the Western United States and *M. vexillorum* in the Southwestern United States.

Included in this paper are comprehensive descriptions of adult females of two new species of *Matsucoccus,* one from Minnesota and one from Guatemala. The key to the North American species of *Matsucoccus* by Ray and Williams (1984) is modified to accommodate the new species. In the following descriptions, measurements are given in microns and are presented in the text as the average followed in parentheses by the range. Measurements of *M. banksianae* are based on a series of 10 specimens, those of *M. oocarpae* on the 4 available specimens.

Matsucoccus banksianae, NEW SPECIES (Fig. 1)

Etymology.—This species is named after its only known host, jack pine, *Pinus banksiana* Lambert.

Material studied.—*Pinus banksiana:* 1, Cass Co., Minn., June 13, 1941, R. F. Anderson (Paratype, USNM); 1, Cass Co., Minn. July 10, 1941, R. F. Anderson (Paratype, USNM); 5, Cass Co., Minn. July 13, 1941, R. F. Anderson (Paratype, USNM); 1, Cass Co., Minn. July 16, 1941, R. F. Anderson (Paratype, USNM); 5(10), Ely,

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Minn. June 1962, J. C. Bean (Holotype, Paratype, USNM).

General description.—Body (Fig. 1A) parallel-sided to elongate-oval, widest point on abdomen, posterior apex more broadly rounded than head; 3538 (2252–4814) long, 1507 (1182–1875) wide. Legs and antennae well developed; fleshy sensory setae on antennal segments 6 to 9 inclusive; multilocular disc pores present, body setae of 1 size; bands of cicatrices varying widely.

Dorsal surface.—Six to 10 setae (Fig. 1B) scattered on head, 5 rows encircling thorax, 15–30 in row 1, 18–52 in row 2, 32–46 in row 3, 14–40 in row 4, 33–57 in row 5; 8 rows encircling abdomen, 24–39 in row 1, 22–40 in row 2, 21–40 in row 3, 25–56 in row 4, 17–41 in row 5, 20–39 in row 6, 21–33 in row 7, 19–32 in row 8. Additional setae in short marginal bands between complete abdominal rows and between anterior abdominal row and metathoracic legs. Abdominal setae 8 (6–9) long. Eyes single-faceted, 22 (19–27) in diameter, with transversely oval surrounding sclerotization 60 (49–69) wide. Bilocular tubular ducts (Fig. 1C) moderately to heavily sclerotized on lateral margins, margins straight with occasionally swollen bases, divergent, bases unsclerotized to heavily sclerotized; 11 (10–15) total diameter, 4 (4–5) width of duct orifice, 9 (9–10) high. Five to 10 total on head; in 5 rows encircling thorax, 9–15 in row 1, 7–28 in row 2, 14–23 in row 3, 14–30 in row 4, 25–37 in row 5; 8 rows encircling abdomen, 26–35 in row 1, 26–36 in row 2, 30–40 in row 3, 27–39 in row 4, 27–38 in row 5, 23–35 in row 6, 23–28 in row 7, 9–24 in row 8; in short marginal bands between complete abdominal row and metathoracic legs. Cicatrices (Fig. 1D) in 3, 4, or 5 transverse rows on abdomen, 85–366 in number, 8 (6–10) in diameter; first row located between 2nd and 3rd or 3rd and 4th pairs of abdominal spiracles.

Ventral surface.—Body setae indistinguishable from, and continuous with, rows of dorsal setae; 7–12 on head; abdominal setae 11 (7–14) long; longest near coxae (Fig. 1E) 12 (9–21). Antennae (Fig. 1F) well developed, 9-segmented, 627 (521–728) long. Terminal 4 segments with fleshy setae. Segment II with 4–7 campaniform sensilla. Segments III through VIII with 0–2 intersegmental sensilla and 0–3 coeloconic sensilla. Scape with a dorsal cluster of 8–13 setae, 7 (5–10) long; longest seta on segment II 23 (19–31) long; fleshy setae on segment VIII 20 (15–23) long. Legs (Fig. 1G) well developed, 804 (712–981) long; 2 claw digitules and 2 setiform tarsal digitules. Trochanters with 6–11 sensoria and usually 1 long seta. First tarsal segment with 1–4 campaniform sensilla. Thoracic spiracles (Fig. 1H) typical of genus, anterior pair 62 (42–90) long from orifice to tracheae, width of atrium 30 (20–40), width of sieve 13 (11–15); posterior pair 55 (47–65) long from orifice to tracheae, width of atrium 29 (22–35), width of sieve 12 (9–15). Seven pairs of abdominal spiracles (Fig. 1I), sclerotized ring surrounding orifices; diameter 13 (10–20). Cluster of 30–68 multilocular disc pores (Fig. 1J) at apex of abdomen, total diameter 10 (9–12), diameter of locule ring 6 (5–7), width of tubular duct orifice 4 (4–5), 10 (8–11) high. Locule ring with 9–13 loculi. Bilocular tubular ducts in continuous series with, and similar to, dorsal bilocular tubular ducts. One to 4 small discoidal pores (Fig. 1K), 4 (3–5) in diameter, midventrally between pro- and mesothoracic legs and similarly between meso- and metathoracic legs.

Other stages.—Other stages are unknown except the cyst stage, third stage males, and adult males which are similar to those of *Matsucoccus alabamae.*

Type material.—Holotype adult female and 9 paratype adult females on 5 slides collected on *Pinus banksiana,* Ely, Minn. June 1962 by J. C. Bean. One paratype adult female on 1 slide collected on *P. banksiana,* Cass Co., Minn. June 13, 1941, by R. F. Anderson. One paratype adult female on slide collected on *P. banksiana,* Cass Co., Minn. July 10, 1941, by R. F. Anderson.

Five paratype adult females on 5 slides collected on *P. banksiana,* Cass Co., Minn. July 13, 1941, by R. F. Anderson. One paratype adult female on 1 slide collected on *P. banksiana,* Cass Co., Minn. July 16, 1941, by R. F. Anderson. The holotype and 2 paratypes deposited in U.S. National Museum of Natural History, Beltsville, Md.; one paratype in Coccoidea collections of each of the following: University of Georgia, Experiment; Florida State Collection of Arthropods, Division of Plant Industry, Florida Department of Agriculture and Consumer Services, Gainesville; California Department of Food and Agriculture, Sacramento; Virginia Polytechnic Institute and State University, Blacksburg; British Museum of Natural History, London, England; Canadian National Collections, Ottawa, Canada; Naturhistorishes Museum, Wien, Austria; University of California at Davis; Museum National d'Histoire Naturelle, Entomologie Generale et Appliquee, Paris, France. One paratype has been retained in the Coccoidea collection of Auburn University.

Matsucoccus oocarpae, New Species
(Fig. 2)

Etymology.—This species is named for its only known host, *Pinus oocarpa* Schiede.

Material studied.—*Pinus oocarpa*: 2(3), Quezaltenango, Guatemala, July 10, 1944, E. J. Hambleton (Paratype, 1 USNM, 1 AU); 1, Ostuncalco, Guatemala, July 10, 1944, E. J. Hambleton (Holotype, USNM).

General description.—Body (Fig. 2A) parallel-sided to elongate-oval, widest point on abdomen, posterior apex more broadly rounded than head; 3968 (3366–4418) long, 1972 (1733–2209) wide. Legs and antennae well developed; fleshy sensory setae on antennal segments 6 to 8 (segment 9 missing from available material); multilocular disc pores present; body setae of 1 size; marginal band of bilocular tubular ducts between last thoracic row and first abdominal row extending entirely across dorsum; circatrices in 4 bands with perhaps a slightly-developed 5th band.

Dorsal surface.—Approximately 8 setae (Fig. 2B) scattered on head, 5 rows encircling thorax, 25–26 in row 1, 31–53 in row 2, 29–46 in row 3, 23–28 in row 4, 50–51 in row 5; 8 rows encircling abdomen, 32–34 in row 1, 35–43 in row 2, about 36 in row 7, about 37 row 8 (other rows not enumerated due to poor condition of specimens). Additional setae in short marginal bands between complete abdominal rows and between anterior abdominal row and metathoracic legs. Abdominal setae 9 (7–11) long. Eyes single-faceted, 26 (26–27) in diameter, with transversely oval surrounding sclerotization 70 (67–74) wide. Bilocular tubular ducts (Fig. 2C) with relatively divergent tubules, more so basally, sides of tubules lightly to moderately sclerotized, bases swollen, bases lightly sclerotized to unsclerotized; about 12 total diameter, 5 (4–5) width of duct orifice, 10 (10–11) high. Eleven to 13 total on head; in 5 rows encircling thorax, 47–74 in row 1, 38–46 in row 2, 25–41 in row 3, 31–44 in row 4, 19–22 in row 5; in 8 rows encircling abdomen, 50–64 in row 1, 51–70 in row 2, about 34 in row 7, about 31 in row 8 (other rows not enumerated due to poor condition of specimens). Additional bilocular tubular ducts in short marginal bands between complete abdominal rows and between anterior abdominal row and metathoracic legs, the latter extending across entire dorsum. Cicatrices (Fig. 2D) in 4 transverse bands on abdomen, 690–890 in number, 8 (6–10) in diameter; first band located between 2nd and 3rd or 3rd pairs of abdominal spiracles.

Ventral surface.—Body setae indistin-

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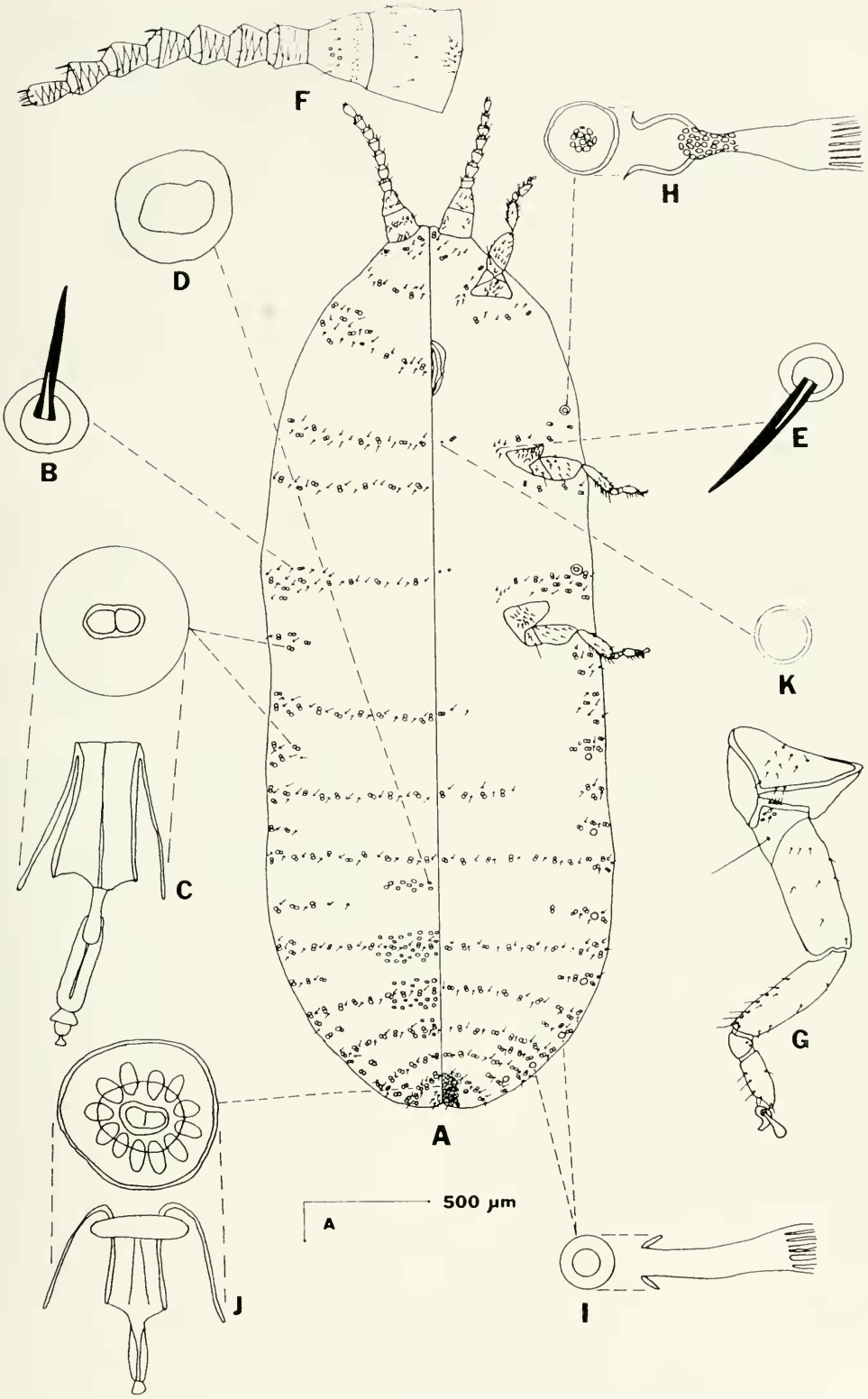
Fig. 1. *Matsucoccus banksianae,* n. sp., adult female.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guishable from, and continuous with, rows of dorsal setae; about 8 on head; abdominal setae 13 (10–14) long; longest near coxae (Fig. 2E) 15 (14–15) long. Antennae (Fig. 2F) well developed, apparently 9-segmented, no specimens with antennae complete. Segments VI, VII and VIII with fleshy setae. Although segment 9 was missing on all available specimens, other species of *Matsucoccus* in North America with 9-segmented antennae have 4–5 setae and 2 fleshy setae on segment 9. Segment II with 3–6 campaniform sensilla. Segments III though VI with 0–2 intersegmental sensilla and 0–3 coeloconic sensilla. Scape with a dorsal cluster of 11–14 setae, 8 (7–9) long; longest seta on segment II 41 (38–43) long; fleshy setae 24 (21–26) long. Legs (Fig. 2G) well developed, 1084 (985–1204) long; 2 claw digitules and 2 setiform tarsal digitules. Trochanters with 10–13 sensoria and 1 long seta. First tarsal segment with 2 campaniform sensilla. Thoracic spiracles (Fig. 2H) typical of genus, anterior pair 80 (65–88) long from orifice to tracheae, width of atrium 32 (32–33), width of sieve 12 (12–12); posterior pair 75 (67–85) long from orifice to tracheae, width of atrium 37 (33–40), width of sieve 14 (12–15). Seven pairs of abdominal spiracles (Fig. 2I), sclerotized ring surrounding orifices; diameter 16 (14–21). Cluster of 71–92 multilocular disc pores (Fig. 2J) at apex of abdomen, total diameter 11 (10–12), diameter of locule ring 6 (6–6), width of tubular duct orifice 4 (4–4), 9 (7–12) high. Locule ring with 10–13 loculi. Bilocular tubular ducts in continuous series with, and similar to, dorsal bilocular tubular ducts. Four small discoidal pores (Fig. 2K), 4 (4–4) in diameter, midventrally between meso- and metathoracic legs. Three to 4 similar pores between pro- and mesothoracic legs.

Other stages.—First instars and cysts are included in the dry and slide-mounted material. Both stages are typical of their respective stages of *Matsucoccus.*

Type material.—Holotype adult female collected on *Pinus oocarpa,* Ostuncalco, Guatemala, July 10, 1944, by E. J. Hambleton. Three paratype adult females on 2 slides collected on *P. oocarpa,* Quezaltenango, Guatemala, July 10, 1944, by E. J. Hambleton. The holotype and 1 paratype deposited in U.S. National Museum of Natural History, Beltsville, Md.; one paratype had been retained in the Coccoidea collection of Auburn University.

Key

Ray and Williams (1984) provided a key to the North American species of *Matsucoccus* which included 17 species. That key may be modified as follows to accommodate the new species here described:

11.	Marginal band of bilocular tubular ducts between last thoracic row and first abdominal row extending across abdominal dorsum	12
11′.	Marginal band of bilocular tubular ducts between last thoracic row and first abdominal row not extending across abdominal dorsum	12a
12.	Cicatrices in 4 bands, some specimens with slightly developed 5th band; feeding on *P. oocarpa*	*M. oocarpae,* n. sp.
12′.	Cicatrices in 5 or more bands; on *P. ponderosa*	*M. vexillorum* Morrison
12a.	Tubules of bilocular tubular ducts often adherent; feeding on pines of subsection *Ponderosae*	*M. californicus* Morrison
12a′.	Tubules of bilocular tubular ducts often divergent; not feeding on pines of subsection *Ponderosae*	12b
12b.	Cicatrices usually in 4 distinct bands, the anterior about ½ width of other bands; feeding on pines of subsection *Australes*	*M. alabamae* Morrison
12b′.	Cicatrices in widely varying bands; feeding on *P. banksiana* of the subsection *Contortae*	*M. banksianae,* n. sp.

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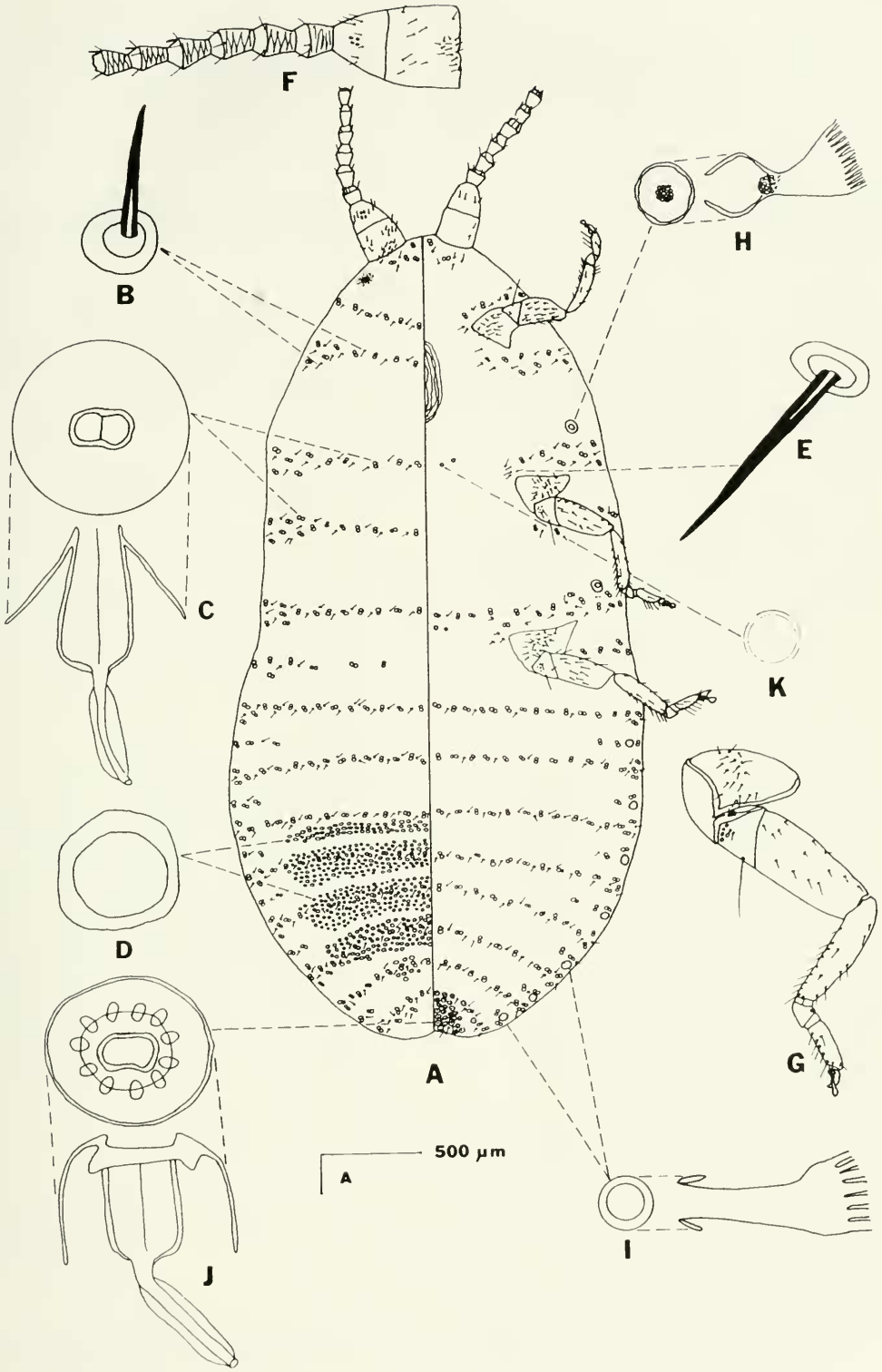
Fig. 2. *Matsucoccus oocarpae,* n. sp., adult female.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Discussion

Matsucoccus alabamae, M. banksianae, M. californicus, M. oocarpae and *M. vexillorum* form a group of species which share the following characteristics. All 5 species lack fleshy sensory setae on antennal segment 5, have legs and antennae well developed, possess multilocular disc pores at the apex of the abdomen and possess only 1 size of body setae. *Matsucoccus alabamae* and *M. californicus* feed on the trunks of their hosts (personal observations) while *M. vexillorum* feeds on twigs of its hosts (McKenzie 1943). All feed on pines of the section *Pinus,* each species feeding on pines of a single subsection of *Pinus.*

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